



January 31, 2013

Dear Chancellor,

My name is JunJun Feng and I am a current student at the Massachusetts Institute of Technology. It has come to my attention that MIT is looking to cut back its research funding on certain fieldworks of the campus. Hearing of this, I have become very concerned of the possible impacts of such decisions on Professor Tsai and her work on Alzheimer's disease.

Though Professor Tsai's work is not known by many, her findings are bound to impact those worldwide. Alzheimer's disease is a chronic condition that consists of a loss or decline in memory and other cognitive abilities. Its prevalence has been estimated to be about 10% overall among those over the age of 65, and almost 50% among those over the age of 85 (10 Million). Nationally, there are approximately 4.5 million Americans living with Alzheimer's disease today, a number that is expected to double by the year 2030 (Millions). Much to our dismay, these 4.5 million people aren't the only ones suffering from Alzheimer's. Alzheimer's is one of the most devastating illnesses of our time to impact seniors and their loved ones. It has been known that caring for someone with Alzheimer's disease requires a great amount of patience and vigilance. Its difficulty has been found by many, as people cannot stand to watch their loved ones struggle mentally. Unfortunately, there is no available cure for Alzheimer's. Therefore, caretakers cannot do much but personally witness the disease rob loved ones of not only their pasts but also their futures. Alzheimer's, being a chronic form of dementia, results in severe memory loss and eventual death. The average lifespan of someone with Alzheimer's is around 8 years, with a possible additional 12 years if assisted with proper care (10 Million). The disease is now the seventh deadliest illness in the nation (10 Million).

Professor Tsai is the Picower Professor of Neuroscience in the Department of Brain and Cognitive Sciences at the Massachusetts Institute of Technology. With a keen interest in Alzheimer's disease, Professor Tsai is finding ways to cure Alzheimer's and end the dementia of many. In her research, she hypothesizes that chemical cleavage in nerve cells of p35 to a smaller fragment, called p25, may be an early event in neurodegeneration (HHMI). In prior research, Professor Tsai has already discovered that the p25 levels in Alzheimer's patients are regularly higher

in postmortem brain tissue as compared to normal subjects. Therefore, she aimed to study how the elevated levels of p25 affected the brain and its possible remedy. Using the method of animal research to study more on this regards, Professor Tsai created mice that allowed her to overexpress the p25 gene in the forebrain of the animal for varying amounts of time. Creating mice with Alzheimer's-like brain atrophy, Tsai discovered, that when exposed to high levels of p25 for six weeks, the animal had significant neuronal loss and altered tau proteins, the protein responsible for forming tangles inside the brain cells of Alzheimer's patients (HHMI). Furthering the research, Tsai began to experiment ways for the mice with neurodegeneration to recover some of its long-lost memory. Through her research, she found that the enriched environment of companion mice, toys and treadmills, helped restore memory in the mice. Additionally, sodium butyrate, which removes the acetyl chemical group from chromatin, also retrieved long-lost memory in p25 animals (HHMI). It was therefore concluded that there were genetic and environmental factors that affected the onset of Alzheimer's.

Advancing a scientific breakthrough, Tsai and her team now pinpointed the exact gene responsible in which mice with symptoms of Alzheimer's disease regained long-term memories and the ability to learn. Furthering her discoveries, Tsai aimed to discover a drug that Alzheimer's patients could ingest in purpose to cure the onset of the disease. Using animal research, researchers treated mice with Alzheimer's-like symptoms using histone deacetylase (HDAC) inhibitors which affected the gene HDAC2 responsible for the brain's ability to change in response to experience and memory formation. HDAC inhibitors are known to be master regulators of gene expression (MIT-led). Therefore, Tsai hoped that with this inhibitor, chromatin remodeling would be achieved in retrieving long-lost memory in p25 animals. Findings showed, that after taking HDAC inhibitors, the mice with Alzheimer's-like symptoms regained their long-term memories and ability to learn new tasks (MIT-led). It was concluded that the HDAC brought about long-lasting changes in how other genes were expressed, through increasing the numbers of synapses and restructuring neural circuits, thereby enhancing memory (MIT-led). In continuous pursuit for the cure of Alzheimer's, Tsai and her colleagues have discovered that drugs that affect the gene HDAC2 reverse the effects of Alzheimer's and boost cognitive function in mice with Alzheimer's-like symptoms (MIT).

MIT needs to support the worthy cause of the cure for Alzheimer's disease. Long-term benefits of Professor Tsai's program may not be obvious today, but the impact on future generations will be enormous. Alzheimer's is frightening and devastating in how it impacts not only those with the disease, but also their caregivers. More than 15 million family and friends currently are caring for the

4.5 million of Americans suffering with Alzheimer's today (Millions). With Professor Tsai's research on the HDAC2 gene and its protein, MIT develops promising objectives for treating memory impairment. Her research could lead to new types of treatments to improve cognitive ability in Alzheimer's patients and simultaneously end the pain and heartbreak endured by their loved ones. To conclude, Professor Tsai's work, in no doubt, will lead to further advances in the cure of Alzheimer's and further advances in the field of neuroscience.

Sincerely yours,

Jun Jun Feng

Work Cited:

"10 Million Baby Boomers Face Alzheimer's Epidemic." *Mercola*. Mercola, 1 Apr. 2008. Web. 31 Jan. 2013. <<http://articles.mercola.com/sites/articles/archive/2008/04/01/10-million-baby-boomers-face-alzheimer-s-epidemic.aspx>>.

"HHMI Scientist Bio: Li-Huei Tsai, Ph.D." *HHMI Scientist Bio: Li-Huei Tsai, Ph.D.* Howard Hughes Medical Institute, n.d. Web. 30 Jan. 2013. <http://www.hhmi.org/research/investigators/tsai_bio.html>.

"Millions Of People Worldwide Suffer From Alzheimer's - Number Of Cases Feared To Double In Coming Years." *Medical News Today*. MediLexicon International, 10 Sept. 2006. Web. 30 Jan. 2013. <<http://www.medicalnewstoday.com/releases/51477.php>>.

"MIT-led Team IDs Gene Key to Alzheimer's-like reversal." *MIT-led Team IDs Gene Key to Alzheimer's-like Reversal*. E! Science News, 6 May 2009. Web. 30 Jan. 2013. <<http://esciencenews.com/articles/2009/05/06/mit.led.team.ids.gene.key.alzheimers.reversal>>.